



Long term trend of pH and major chemical constituents of rainwater at the GAW stations in India.

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Long term trend of annual precipitation volume weighted concentrations of major chemical constituents (SO_4^{2-} , NO_3^- , Cl^- , NH_4^+ , Ca^{2+} , Mg^{2+} , Na^+ and K^+) along with pH is studied for three decades (1986-2016) at all the ten Global Atmospheric Watch (GAW) stations in India. Mohanbari and Jodhpur stations have recorded the lowest (5.01 ± 0.66) and highest (6.74 ± 0.83) long term annual mean pH. The long term annual mean pH showed decreasing trend at all the stations (significant at better than 1% level at 8 of 10 stations). Decadal mean pH for 1986-1995 to 1996-2005 period showed decreasing trend at all the stations whereas decadal mean pH for 1996-2005 to 2006-2016 period showed improvement at six stations. The percentage occurrence of acidic pH (< 5.65) at ten stations ranged from 7 to 89 and it increased from 1986-1996 to 2006-2016 at half of the total ten stations. The total ionic mass was lowest ($139.5 \mu\text{eq/l}$) at Kodaikanal a high altitude hill top GAW station while Jodhpur, an arid station had not only highest total ionic content ($1221.8 \mu\text{eq/l}$) but also had highest concentrations of Ca^{2+} , SO_4^{2-} , Na^+ and K^+ among all the stations. Temporal variation of annual mean values of nssSO_4^{2-} , NO_3^- , Ca^{2+} and NH_4^+ has shown an increasing trend for nssSO_4^{2-} at all the ten stations and for NO_3^- at four stations leading to decreasing trend for pH at all the stations. However, Ca^{2+} and NH_4^+ have showed an inverse trend among them at most of the stations. Long term mean deposition rates of eight major ions of rain water at the ten stations has revealed that long term mean deposition of NO_3^- is maximum at all the inland and coastal stations ranging from 11.4 to 63.3 Kg / ha whereas at island stations of Port Blair and Minicoy the long term mean deposition of Cl^- is highest among the eight major ions of rain water. Apart from the neutralization and acidic potentials of rain water, source apportionment for ionic species at different environments is also attempted.